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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/028,433 | 12/28/2001 | Young-Sang Byun | 3430-0175P | 4398 |
| 2292 | 7590 | 08/02/2007 | EXAMINER | |
| BIRCH STEWART KOLASCH & BIRCH PO BOX 747 FALLS CHURCH, VA 22040-0747 | | | | DUONG, THOI V |
| ART UNIT | | PAPER NUMBER | | |
| | | 2871 | | |
| NOTIFICATION DATE | | DELIVERY MODE | | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

| | | | |
|------------------------------|------------------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/028,433 | BYUN ET AL. | |
| | Examiner | Art Unit | |
| | Thoi V. Duong | 2871 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 12 July 2007.
- 2a) This action is **FINAL**. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1,2,4,7-10 and 12-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1,2,4,7-10 and 12-24 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

| | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 12, 2007 has been entered.

Accordingly, claims 1, 9, 21, 22 and 24 were amended, and claims 3, 5, 6 and 11 were cancelled. Currently, claims 1, 2, 4, 7-10 and 12-24 are pending in this application.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 22 and 24 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The specification does not describe the limitation "the resonating plate is free of contact with the liquid crystal material in the

projecting portion" recited in the claims. Fig. 3 only shows that the resonating plate 124 is directly formed on the projecting portion 126.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1, 2, 4, 9, 10 and 12-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over von Gutfeld et al. (von Gutfeld, USPN 6,055,035) in view of Paton et al. (Paton, USPN 4,018,383).

Re claim 1, as shown in Figs. 2A, 2B and 3, von Gutfeld discloses a method of forming a liquid crystal layer on a substrate, comprising:

preparing a liquid crystal material in a projecting portion 20 comprising a nozzle fixture 21 and a LC source 23;

applying a pressure to the projecting portion 21 so as to emit the liquid crystal material (col. 5, lines 11-65);

moving the substrate 1A in one direction (col. 6, lines 8-14); and

depositing the liquid crystal material from the projection portion 20 uniformly onto the substrate during the moving of the substrate in the one direction (col. 5, lines 30-37).

Re claim 9, as shown in Figs. 1, 2A, 2B and 3, von Gutfeld discloses an apparatus for forming a liquid crystal layer on a substrate, comprising:

a projecting portion 20 having a nozzle plate 21 containing a nozzle aperture 22 for emitting a liquid crystal material; and

a stage 1 for moving the substrate 1A in one direction during emitting of the liquid crystal material from the projecting portion 21 uniformly onto the substrate (col. 5, 30-37 and col. 6, lines 8-14).

Von Gutfeld discloses a method of forming a liquid crystal layer on a substrate that is basically the same as that recited in claims 1 and 9 except for a resonator for applying an on voltage during emitting of the liquid crystal material to generate a vibration so as to apply a pressure to the projecting portion to emit the liquid crystal material from the projection portion, and a resonating plate is placed between the resonator and the projecting portion and outside of the projecting portion.

As shown in Fig. III, Paton discloses an ink-jet system comprising:

a resonator 39 (piezoelectric crystal) mounted on a projecting portion 30 (housing) for generating a vibration upon application of an on voltage to the resonator 39 during emitting of the liquid material (col. 1, lines 6-23; col. 1, line 66 through col. 2, line 8; col. 2, lines 58-67; col. 5, line 65 through col. 6, line 19; col. 9, lines 16-39; and col. 10, lines 12-31),

wherein the generated vibration is transmitted from the resonator 39 to the projecting portion 30 through a resonating plate 38 (impervious membrane) located between the resonator 39 and the projecting portion 30 and outside of the projecting portion 30 so as to apply a pressure to the projecting portion 30 to emit the liquid droplets from a nozzle 32 of the projection portion 30 (col. 7, lines 54-60).

Art Unit: 2871

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of forming a liquid crystal layer on a substrate of von Gutfeld with the teaching of Paton by employing a resonator and a resonating plate placed between the resonator and the projecting portion and outside of the projecting portion for generating a vibration upon application of an on voltage during emitting of the liquid crystal material so as to apply a pressure to the projecting portion to emit the liquid crystal material from the projecting portion into a stream of uniformed sized drops being substantially free from satellite drops (col. 7, lines 49-53 and col. 10, lines 12-19).

Re claims 2 and 10, as shown in Fig. 2A, von Gutfeld discloses that the projecting portion 20 has a nozzle plate 21 (fixture) containing a plurality of orifices 22, said nozzle plate adjusting the applied pressure for emitting the liquid crystal material, the liquid crystal material being emitted through the plurality of orifices (col. 5, lines 30-58 and col. 7, lines 47-55).

Re claims 4 and 13, von Gutfeld discloses that the liquid crystal material is emitted and deposited in a vacuum chamber 60 (Figs. 6 and 7, and col. 7, lines 36-55); accordingly, it is obvious that the vacuum chamber encompasses the projection portion, the resonator and the resonating plate used to emit the liquid crystal material.

Re claims 15 and 16, as shown in Figs. 2B and 3 of von Gutfeld, the volume of the emitted liquid crystal material is adjusted by a CPU 25 to obtain the correct amount of the liquid crystal material deposited on the panel 1A according to a position of the nozzle plate 21 or the moving substrate (col. 5, line 50 through col. 6, line 14).

Art Unit: 2871

Accordingly, it is obvious that the CPU 25 is operated by an on voltage according to a position of the nozzle plate 21 or the moving substrate so as to allow a uniform amount of the liquid crystal material to be ejected through the nozzle plate (col. 5, line 50 through col. 6, line 14).

Re claim 12, as shown in Fig. 3, since von Gutfeld discloses that the stage 1 is moved in relation to a fixed projection portion 20 (col. 6, lines 8-14), it is obvious that means is provided for moving the stage.

Re claim 14, Paton discloses that means (source of a combined signal) is provided for generating vibration in the resonator 5 (col. 7, lines 12-24 and 42-44).

Re claims 17 and 19, Paton discloses that the liquid material is emitted from the projecting portion by only the pressure applied to the projecting portion (col. 9, lines 16-21).

Re claims 18 and 20, Paton discloses that the liquid material is emitted from the projecting portion by the pressure applied to the projecting portion without applying an electric field to the liquid material during emitting of the liquid material (col. 5, lines 34-54 and col. 7, lines 12-24).

Re claims 21 and 23, as shown in Fig. III, Paton discloses that the resonating plate 38 is placed between the resonator 39 and the projecting portion 30 (housing) such that a first surface (upper surface) of the resonating plate 38 is in contact with the resonator 39 and a second surface (lower surface) of the resonating plate 38 is in contact with an upper surface of the projecting portion 30 (col. 8, lines 33-47),

Art Unit: 2871

wherein re claims 22 and 24, as shown in Fig. III, the resonating plate 38, which is sealed on top of the flange 35 of the projecting portion 30 and outside of the projecting portion 30 (col. 8, lines 41-44), is obviously free of contact with the liquid material in the projecting portion 30.

6. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over von Gutfeld et al. (von Gutfeld, USPN 6,055,035) in view of Paton et al. (Paton, USPN 4,018,383) as applied to claims 1, 2, 4, 6, 9, 10 and 12-20 above, and further in view of Masazumi et al. (Masazumi, USPN 6,331,884 B1).

As shown in Fig. 4, von Gutfeld discloses at least of the substrates, 1A or 1B, having a sealed pattern 41 (col. 7, lines 24-27). However, von Gutfeld as modified in view of Paton does not disclose a black matrix formed under the sealed pattern, wherein the liquid crystal material start and stop is deposited on the black matrix as recited in claims 7 and 8.

As shown in Fig. 5, Masazumi discloses a black matrix 8 (black light absorbing layer) formed under a sealed pattern 9b' (col. 16, lines 18-23), wherein a liquid crystal material 9a, 9a', 9a'' start and stop is deposited on the black matrix.

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the method of von Gutfeld with the teaching of Masazumi by forming a black matrix under a sealed pattern for enabling display of a black which is background color when the liquid crystal is transparent (col. 10, lines 1-10).

Response to Arguments

7. Applicant's arguments filed June 12, 2007 have been fully considered but they are not persuasive.

Applicant argued that the combination of Gutfeld and Paton fails to teach "placing a resonating plate between a resonator and the projecting portion and outside the projecting portion" since, when applying Paton's impervious membrane to modify Gutfeld, Paton's impervious membrane will be inside Gutfeld's apparatus 20 (i.e., inside the nozzle fixture 21) in order to be in contact with the liquid crystal material and Paton's piezoelectric crystal will be outside Gutfeld's nozzle fixture 21.

The Examiner disagrees with Applicant's remarks since, as shown in Fig. III, Paton discloses an ink-jet system comprising a resonating plate 38 located between the resonator 39 and the projecting portion 30 (housing) and outside of the projecting portion 30 comprising chamber 31 and nozzle 32 for transmitting the vibration to the chamber so as to emit the liquid material into a stream of uniformed sized drops being substantially free from satellite drops. This housing 30 comprising the chamber 2 and the nozzle 4 is similar to the nozzle fixture 21 in Fig. 2A of Gutfeld. Thus, one of ordinary skill in the art would have a motivation to modify the apparatus for forming a liquid crystal layer on a substrate of Gutfeld by employing a resonating plate and a resonator in the nozzle fixture of Gutfeld such that the resonating plate is located between the resonator and the projecting portion and outside the projecting portion for transmitting the vibration from the resonator to the nozzle fixture through the resonating plate as taught by Paton in order to emit the liquid crystal material into a stream of

Art Unit: 2871

uniformed sized drops being substantially free from satellite drops. Since the modification is feasible and beneficial, one of ordinary skill in the art would not have any problem to make the apparatus of Gutfeld work.

The Applicant also argued that the combination of Gutfeld and Paton fails to teach "the resonating plate is free of contact with the liquid crystal material in the projecting portion" as recited in claims 22 and 24. The Examiner again disagrees with Applicant's remarks since Paton discloses that the resonating plate 38 is formed on the flange 35 of the projecting portion 30 and outside of the projecting portion 30 as shown in Fig. III, it is obvious that the resonating plate 38 is free of contact with the liquid material in the projecting portion.

Thus, a *prima facie* of obviousness has been established since the combination of the teachings of the prior art produces the claimed invention. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thoi V. Duong whose telephone number is (571) 272-2292. The examiner can normally be reached on Monday-Friday from 8:30 am to 4:30 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms, can be reached at (571) 272-1787.

Thoi V. Duong – Primary Examiner
July 18, 2007

